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U.S. Department of Agriculture  
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# **WOOD DUCK BANDING PROGRAM PROGRESS REPORT, 1959 and 1960**



**SPECIAL SCIENTIFIC REPORT: WILDLIFE No. 59**

**UNITED STATES DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE**

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United States Department of the Interior  
Fish and Wildlife Service  
Bureau of Sport Fisheries and Wildlife

**WOOD DUCK BANDING PROGRAM**

**Progress Report, 1959 and 1960**

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U. S. Fish and Wildlife Service  
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# ABSTRACT

A wood duck banding program was initiated in the Mississippi Flyway in 1959, and renewed emphasis was placed on wood duck banding in the Atlantic Flyway. In 1960, cooperators in the United States and Canada banded 10,563 wood ducks, a 49 percent increase over the number banded in 1959. Uses and limitations of the data are discussed. Pre-hunting season banding provided the most data, but banded samples were too small and too poorly distributed to provide reliable information on population characteristics. The geographical distribution of recoveries from ducks banded in 1959-60 is reported. The data are examined for changes in recovery rates between years, for regional differences in recovery rates associated with the opening dates of the hunting season, and for differences in recovery rates between age groups. In order to indicate the possibilities for use of the data, rough approximations are made of the size, age composition, and harvest rate of the wood duck population in the Mississippi and Atlantic Flyways prior to the 1960-61 hunting season.

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## INTRODUCTION

Because of the wood duck's unique distribution and habitat, reliable population figures are not obtained in annual surveys of waterfowl breeding and wintering grounds. As a result, there has been considerable disagreement concerning the status of the species. In an attempt to correct this situation, the technical section of the Mississippi Flyway Council recommended that a wood duck banding program be undertaken to obtain the necessary information to guide sound management practices. This program began in 1959. In the Atlantic Flyway, although a large number of wood ducks were banded prior to 1959, renewed emphasis was given to wood duck banding.

This report summarizes the banding and recovery data for 1959 and 1960, discusses the uses and limitations of the data and presents preliminary findings.

## BANDING EFFORT

Wood duck banding done by cooperating individuals and agencies during 1959 and 1960 and the early months of 1961 is summarized in table 1.

During 1959, 7,071 wood ducks were banded in the United States and Canada. In Mississippi Flyway States 5,304 wood ducks were banded; 75 percent of the continental total. Within the Mississippi Flyway, 920 wood ducks were banded in Wisconsin. More than 500 wood ducks were banded in each of the States of Minnesota, Michigan, Ohio, Missouri, and Louisiana. The banders in six States banded 73 percent of the Flyway total. In Atlantic Flyway States 1,502 wood ducks were banded; 21 percent of the continental total. The banding of 667 wood ducks in New York contributed 44 percent of the Atlantic Flyway total. Banders in Vermont and West Virginia, combined, banded 597 wood ducks. Thus, 84 percent of the wood ducks banded in the Atlantic Flyway were banded in three States.

During 1960, 10,563 wood ducks were banded in the United States and Canada. This was an increase of 49 percent over the number banded in 1959. The increase was largely the result of greater banding effort in States that were well represented in 1959. As in 1959, banding in 1960 was concentrated in relatively few States. In Mississippi Flyway States 7,625 wood ducks were banded; 72 percent of the continental total. Within the Mississippi Flyway 2,248 wood ducks were banded in Wisconsin and 1,320 were banded in Illinois. More than 500 wood ducks were banded in each of the States of Indiana, Ohio, and Iowa. Thus, banders in five States contributed 76 percent of the Mississippi Flyway total. In Atlantic Flyway States 2,561 wood ducks were banded; 24 percent of the continental total. Of the wood ducks banded in the Atlantic Flyway, 1,568 (61 percent) were banded in New York and Vermont.

## USES AND LIMITATIONS OF THE DATA

### Pre-hunting Season Banding

The banding of an adequate sample of immature and adult wood ducks in late summer and early fall, before the opening of the hunting season, could provide data for estimating mortality rates, for measuring the importance of hunting as a mortality factor, and determining the effects of regulations on the kill. Estimates also could be made of the size of the pre-hunting season population. Since this is the kind of information most urgently needed, pre-season banding is considered the most important.

Most of the banding in the present program was pre-season banding, but even so, the samples were much smaller and more poorly distributed than they should be for reliable results. Recovery rates are shown in table 2. The sample sizes for most of the States appearing in the table were too small to yield very precise estimates of recovery rates. If 50 recoveries are obtained, the sampling error of the estimated recovery rate is about 30 percent at the 95 percent confidence level. Only banding of immatures in Wisconsin, Illinois, and Vermont, in 1960, produced more than 50 direct recoveries to represent each State of banding. When band recoveries are distributed among the various harvest areas, the reliability of the recovery rate estimate in each area decreases further. For reliable data, there should be enough banding in each State to yield at least 50 recoveries for each age group.

Perhaps of even greater importance than sample size is the representativeness of the banded sample. Wood ducks were sampled inadequately in almost the entire southern United States. Also, portions of the northern area are poorly represented. It is particularly important to band pre-season samples of wood ducks in the southern States that are important harvest areas, such as Texas, Mississippi, Alabama, North Carolina, South Carolina, Georgia, and Florida. Louisiana was the only southern State where more than a small number of adult and immature wood ducks were banded.

### Breeding-ground Banding

In order to relate production areas to harvest areas it is necessary to band birds on the breeding area. The banded birds must be either flightless young (locals) or adult nesting birds to be sure that they did not come from some other area. During 1959-60, too few locals were banded in any State to yield an accurate measure of the direct recovery rate or the distribution of the hunting kill (table 2). For example, in 1959-60 a total of 676 locals were banded in Ohio and only 16 were recovered. Thus, not only were the banded samples small, but the recovery

rate was low. Unless more efficient procedures for capturing locals can be devised, it may not be feasible to band enough locals to provide useful data. It would be highly desirable to band a large sample of local and immature birds in the same area to determine the extent to which immatures have the same distribution pattern as locals. Bait-trapping of flying birds has been much more productive than capture of locals, both in number banded and number recovered.

### Wintering-ground Banding

Wintering-ground banding provides information on the distribution of the hunting kill of wintering populations. Recovery rates from wintering ground banding, in conjunction with recovery rates from pre-season banding, provide information on the total mortality that occurs during the hunting season.

Very little banding was done during the wintering period (January and February) in the present program. During 1959-60, 131 wood ducks were banded in the wintering period; Florida banders supplied 126 of the total. There were no recoveries.

### DISTRIBUTION PATTERN OF RECOVERIES

The distribution pattern of direct recoveries during 1959-60 is presented in table 3 (Atlantic Flyway) and table 4 (Mississippi Flyway). The small number of recoveries for many States of banding in the Atlantic Flyway is apparent in the table. Only two States had a sufficient number of recoveries to show a harvest pattern. The most important outstate recovery areas for birds banded in New York appeared to be Ontario, North Carolina, and Florida. Vermont outstate recoveries were mainly in Quebec, South Carolina, North Carolina, Florida, and Georgia.

The results of the greater banding effort in the Mississippi Flyway can be seen in table 4. The States of Wisconsin, Minnesota, Michigan, Illinois, Missouri, and Indiana had enough recoveries to indicate the most important areas of harvest outside the State of banding. Birds banded in Wisconsin were recovered most frequently in Minnesota, Iowa, Illinois, Arkansas, Texas, Louisiana, and Mississippi. Recoveries of birds banded in Minnesota appeared primarily in Wisconsin, Louisiana, Arkansas, and Alabama. The most important States in the recovery of birds banded in Michigan were Louisiana and Arkansas. Louisiana, Arkansas, Texas, and Mississippi were the primary States of recovery for birds banded in Illinois. Birds banded in Indiana were recovered in greatest numbers in Louisiana, Mississippi, and Texas. Birds banded in Missouri appeared most often in Arkansas, Louisiana, and Texas.

With the exception of the samples from Louisiana, banded samples representing southern States that are important harvest areas were virtually absent. All except a very few of the birds banded in Louisiana were recovered in Louisiana, suggesting that birds banded in southern States contribute very little to the kill outside the State of banding. Much more late summer banding would be needed in the important southern wintering areas to verify this possibility. Also, if all production areas were represented by banded samples, it might be possible to estimate the fraction of the total wood duck kill in wintering areas that represented locally produced birds.

## DIRECT RECOVERY RATES

### Annual Changes in Recovery Rate

Recovery rates in Vermont and New York were lower in 1959-60 than they were in 1958 (table 2) even though the daily bag limit was higher - two birds in 1959-60 and one bird in 1958. No change in recovery rates between 1959 and 1960 is noted for the Mississippi Flyway States. However, sample sizes were too small to detect other than great changes.

### Recovery Rates of Locals and Immatures

In most areas, there was a much lower recovery rate from birds banded as flightless immatures (locals) than from birds banded as flying immatures. In Ohio, the banding of 676 locals resulted in 16 recoveries (2.4 percent), whereas 102 immatures yielded six recoveries (5.9 percent). In Louisiana, there were no recoveries of 68 banded locals, whereas 478 immatures had a 6.3 percent recovery rate. In Indiana, only one recovery resulted from 93 banded locals (1.1 percent), whereas 391 immatures had a 6.4 percent recovery rate. In Wisconsin, in contrast, the banding of 145 locals yielded a recovery rate of 11.0 percent, whereas 2,172 immatures had a 9.3 percent recovery rate. The causes of the extremely low recovery rate of locals that appears in most areas are unknown. However, a relatively high mortality rate among flightless birds seems likely.

### Regional Differences in Recovery Rates

Regional differences in recovery rates of immature wood ducks appear to be associated with differences in the opening dates of the hunting season. In 1959 and 1960, the northern States of Minnesota, Wisconsin, Michigan, and Vermont had opening dates from October 7 to 10. A middle tier of States, including Iowa, Illinois, Ohio, and New York, had later opening dates (October 14 to 30). Indiana, Missouri, Tennessee, West Virginia, and Louisiana had the latest opening dates (November 4 to 30). Recovery rates of immatures for

three groups of States are shown in table 7. In 1959, the northern group had a mean recovery rate of 10.2 percent, compared with 5.3 percent for the middle group, and 4.6 percent for the southern group. Similarly, in 1960, the mean recovery rate was 9.2 percent in the northern group, 6.9 percent in the middle group, and 4.5 percent in the southern group. Apparently, birds banded in the northern States with the earliest opening dates are subjected to greater shooting pressure than those in the States further south with later opening dates.

#### Differences Between Age Groups in the Recovery Rate

Generally, the direct recovery rate of birds banded as immatures was greater than that of adults. A measure of the extent to which immature birds are more likely to be shot than adults is needed to interpret age ratios in the hunting kill. Since wood duck age ratios in the hunting kill were measured in the 1959 and 1960 seasons in the Mississippi Flyway, and in the 1960 season in the Atlantic Flyway, table 5 was prepared to provide an estimate of the relative recovery rates. Recovery rates were calculated from the combined data for 1958 (New York and Vermont only), 1959, and 1960 in the major banding States; data for each State were weighted equally. The mean direct recovery rate was 5.5 percent for adults and 7.7 percent for immatures, indicating that immatures were 1.4 times more likely to be recovered than adults.

#### Differences Between Harvest Areas in Relative Recovery Rates

Differences between harvest areas in relative recovery rates are presented in table 6. Data from Vermont and Wisconsin, the States where the most birds were banded, are used to show differences in the relative recovery rate between northern and southern harvest areas. Bandings in Wisconsin indicated a greater relative recovery rate in northern States (1.8) than in southern States (1.3), while bandings in Vermont suggested a greater relative recovery rate in southern States (1.4) than in northern States (1.2). Sample sizes are too small for these estimates to be very precise. Nevertheless, these seemingly inconsistent findings agree with age ratios observed in the duck wing collection. In both the 1959 and 1960 hunting seasons, wood duck age ratios determined from wings collected in the Mississippi Flyway were higher in northern States than in the South (Geis and Carney, 1961). In contrast, age ratios from wings collected in the Atlantic Flyway in 1960 were lower in northern States than in the South (Geis and Carney, 1961).

## ESTIMATE OF THE PROPORTION OF THE PRE-SEASON WOOD DUCK POPULATION BAGGED

The best estimates of recovery rates for the continental pre-season population are 7.7 percent for immatures and 5.5 percent for adults (as shown in table 5 and discussed above). These rates can be used with data from the Mail Questionnaire Survey to estimate the proportion of the pre-season population that was bagged. The Mail Questionnaire Survey indicated that 49 percent of the wood duck bands taken are reported (Geis and Atwood, 1961). When wood duck recovery rates are adjusted to include unreported bands, it is estimated that 15.7 percent of the immatures and 11.2 percent of the adults are bagged each year (hunting kill rate). If there is a crippling loss equal to 25 percent of the birds bagged, the kill estimate becomes 19.6 percent for immatures and 14.0 percent for adults. It is reasonable to assume that annual rates of mortality from all causes are at least 50 percent for immatures and at least 40 percent for adults. If this is true, then hunting would account for less than one-half of the total mortality. It should be emphasized that this estimate is only a rough approximation. However, it suggests that hunting pressure might be less important to the continental wood duck population than it is to the mallard (Smith and Geis, 1961) or the canvasback (Geis, 1960). This does not preclude the possibility that hunting is locally important. For example, it was shown above that recovery rates from wood ducks banded in northern States were substantially higher than those from more southern banding areas.

### PRE-SEASON POPULATION ESTIMATES

Using the hunting kill rates derived in the previous section (15.7 percent for immatures and 11.2 percent for adults), it is possible to estimate the size of the wood duck population before the hunting season. The population estimate is made by dividing the hunting kill rates of each age group into the estimate of the number of birds killed in each age group. The estimate of the total number of birds killed (266,873) is taken from the results of the Mail Questionnaire Survey (Atwood and Wells, 1961 a,b). Segregation of the kill estimate into age groups is based on the weighted age ratio (2.1) in the portion of the hunting kill examined by the Wing Collection Survey (Geis and Carney, 1961). Estimates of the pre-season population size and age ratio may be made from the following relationships:

$$1. K_i/K_a = P_i R_i / P_a R_a \text{ or, } K_i = P_i R_i \text{ and } K_a = P_a R_a$$

$$2. P_i/P_a = \frac{K_i/K_a}{R_i/R_a}$$

$$3. R_i/R_a = \frac{K_i/K_a}{P_i/P_a}$$

$$4. P = P_i + P_a = K_i/R_i + K_a/R_a$$

Where:

Ki = number of immatures in the total kill

= total kill (Mail Quest.) x  $\frac{\text{immature wings}}{\text{total wings}}$  (Wing Coll.)

Ka = number of adults in the total kill

= total kill (Mail Quest.) x  $\frac{\text{adult wings}}{\text{total wings}}$  (Wing Coll.)

Ri = immature hunting kill rate = number recovered/number banded  
(adjusted for unreported bands).

Ra = adult hunting kill rate = number recovered/number banded  
(adjusted for unreported bands).

Pi = number of immatures in the pre-season population (unknown).

Pa = number of adults in the pre-season population (unknown).

Ki/Ka = kill age ratio

Pi/Pa = pre-season population age ratio

Ri/Ra = relative recovery rate of immatures to adults

P = pre-season population

Table 8 summarizes the calculations. The estimate of the 1960 pre-season population in the Atlantic and Mississippi Flyway is about 2,000,000 birds with an age ratio of 1.5 immatures per adult.

#### SUMMARY

A wood duck banding program was initiated in 1959 in the Mississippi Flyway and supplemented by renewed emphasis on wood duck banding in the Atlantic Flyway. In 1960, cooperators in the United States and Canada banded 10,563 wood ducks, a 49 percent increase over the number banded in 1959. Seventy-two percent of the continental total was banded in the Mississippi Flyway States. Lack of an even distribution of banding effort was noted in that banders in five States (Wisconsin, Illinois, Indiana, Ohio, and Iowa) in the Mississippi Flyway banded 76 percent of the Flyway total and banders in two States (New York and Vermont) banded 61 percent of the Atlantic Flyway total.

Uses and limitations of the data are discussed. The pre-hunting season banding provided the most data, but even these samples were much smaller and more poorly distributed than they should be for reliable results. Breeding-ground banding (primarily the banding of flightless young) provided very small samples; the recovery rate also was very low. The possibility of banding flying immatures instead of locals (flightless young) was considered. Only a few birds were banded during the wintering period and there were no recoveries.

The distribution of recoveries from 1959-60 banded samples is reported; in many States, particularly those in the south, an insufficient number of birds were banded to produce a recovery pattern.

Direct band recovery rates were examined for changes between years. There was no discernible increase in the recovery rate from bandings in the States of Vermont and New York between the 1958-59 and 1959-60 hunting seasons, even though the daily bag limit was increased from one bird in 1958-59 to two birds in 1959-60.

There appeared to be regional differences in recovery rate associated with the opening dates of the hunting season. The mean recovery rate of immatures was higher in the more northern States which selected the earlier opening dates than in the southern States which selected later opening dates. This suggests that birds located in the States selecting the earlier opening date are subjected to a greater shooting pressure.

The direct recovery rate of birds banded as immatures was generally greater than that of adults. There appeared to be regional differences in the relative recovery rate. Bandings in Wisconsin indicated a greater relative recovery rate of immatures in the northern States, while bandings in Vermont suggested a greater relative recovery rate of immatures in the southern States. This finding was supported by age ratios observed in the duck wing collection.

A rough approximation of the proportion of the pre-season wood duck population bagged indicated that hunting accounted for less than one-half of the total mortality during 1959-60.

Pre-season population size and age ratio were estimated using information from band recoveries, the Mail Questionnaire Survey, and the Wing Collection Survey. This estimate, which also must be considered very approximate, indicated that the wood duck population in the Atlantic and Mississippi Flyways before the 1960-61 hunting season was about 2,000,000 birds with an age ratio of 1.5 immatures per adult.

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Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961.

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Alabama:</u>							
Dept. of Conservation	1959	June	1	0	14	0	15
		October	<u>2</u>	<u>12</u>	<u>0</u>	<u>0</u>	<u>14</u>
		Total	3	12	14	0	29
	1960	May	2	0	0	0	2
		June	<u>14</u>	<u>0</u>	<u>72</u>	<u>0</u>	<u>86</u>
		Total	16	0	72	0	88
	1961	May	0	0	21	0	21
<u>Arkansas:</u>							
Marcus J. Turner	1960	April	20	0	0	0	20
<u>Delaware:</u>							
Bombay Hook NWR	1959	March	1	0	0	0	1
	1960	March	5	0	0	0	5
<u>Florida:</u>							
Chassahowitzka NWR	1959	September	8	2	0	0	10
		October	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>1</u>
		Total	8	3	0	0	11
	1960	August	1	5	0	0	6
		September	<u>0</u>	<u>11</u>	<u>0</u>	<u>0</u>	<u>11</u>
		Total	1	16	0	0	17
Jacob W. Wolfley	1961	Feb.	22	0	0	0	22
		March	<u>6</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>6</u>
		Total	28	0	0	0	28

Continued-----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Continued).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Florida:</u>							
Goodman K. Larson	1960	Feb.	19	0	0	0	19
Noah H. Long	1960	Feb.	19	0	0	0	19
Leo M. Martin	1961	Jan.	10	0	0	0	10
		Feb.	<u>4</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>4</u>
		Total	14	0	0	0	14
Game & Fresh Water							
Fish Commission	1959	July	0	3	0	0	3
	1961	March	3	0	0	0	3
<u>Georgia:</u>							
N. J. Fleetwood	1960	August	0	9	0	0	9
		Sept.	<u>0</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>2</u>
		Total	0	11	0	0	11
	1961	Feb.	1	0	0	0	1
<u>Illinois:</u>							
Dept. of Conservation	1960	Aug.	65	454	0	0	519
		Sept.	53	275	0	0	328
		Oct.	<u>16</u>	<u>218</u>	<u>0</u>	<u>0</u>	<u>234</u>
		Total	134	947	0	0	1,081
Natural History Survey	1959	April	115	0	0	0	115
		June	12	60	0	0	72
		July	0	48	0	8	56
		Aug.	0	16	0	0	16
		Sept.	12	24	0	2	38
		Oct.	4	8	0	0	12
		Nov.	<u>8</u>	<u>4</u>	<u>0</u>	<u>0</u>	<u>12</u>
		Total	151	160	0	10	321

Continued -----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Continued).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Illinois:</u>							
Natural History Survey	1960	April	0	5	0	0	5
		May	0	27	0	0	27
		June	0	13	0	0	13
		July	0	1	0	0	1
		Sept.	<u>4</u>	<u>6</u>	<u>0</u>	<u>9</u>	<u>19</u>
		Total	4	52	0	9	65
Chautauqua NWR	1959	April	4	0	0	0	4
		May	4	0	0	0	4
		June	2	0	0	0	2
		July	0	21	0	0	21
		August	22	51	0	0	73
		Sept.	5	1	0	0	6
		Dec.	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>
		Total	38	73	0	0	111
	1960	May	9	0	0	0	9
		June	3	2	0	0	5
		July	0	50	0	0	50
		Aug.	6	96	0	0	102
		Sept.	<u>1</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>3</u>
		Total	19	150	0	0	169
Upper Miss. River NWR	1959	Sept.	15	26	0	0	41
Mark Twain NWR	1959	Sept.	3	19	0	0	22
		Oct.	<u>1</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>3</u>
		Total	4	21	0	0	25
	1960	Sept.	0	5	0	0	5
	1961	May	1	0	0	0	1

Continued----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Continued).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages	
<u>Indiana:</u>								
Dept. of Conservation	1959	July	0	0	13	0	13	
		Aug.	16	39	10	0	65	
		Sept.	112	58	0	0	170	
		Oct.	19	21	0	0	40	
		Total	147	118	23	0	288	
	1960	June	2	0	70	0	72	
		July	5	20	0	0	25	
		Aug.	61	109	0	5	175	
		Sept.	368	164	0	0	532	
		Oct.	17	3	0	0	20	
	Total	453	296	70	5	824		
	1961	Feb.	1	0	0	0	1	
	Henry C. West	1960	July	0	1	0	0	1
<u>Iowa:</u>								
Upper Miss. River NWR	1959	Aug.	3	62	0	0	65	
		Sept.	13	34	0	0	47	
		Total	16	96	0	0	112	
	1960	June	6	0	11	0	17	
		July	4	0	47	0	51	
		Aug.	15	407	0	0	422	
		Total	25	407	58	0	490	
	Union Slough NWR	1959	July	4	26	8	2	40
			Aug.	14	24	10	0	48
			Sept.	10	9	0	0	19
			Total	28	59	18	2	107

Continued-----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Continued).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Iowa:</u>							
Union Slough NWR	1960	July	8	0	39	0	47
		Aug.	8	4	13	0	25
		Sept.	0	3	0	0	3
		Total	16	7	52	0	75
Mark Twain NWR	1959	Aug.	0	4	0	0	4
		Sept.	1	19	0	4	24
		Total	1	23	0	4	28
Dept. of Conservation	1960	Aug.	0	21	0	0	21
	1960	July	0	3	0	0	3
		Aug.	0	3	0	0	3
		Sept.	0	4	0	0	4
		Dec.	0	18	0	0	18
	Total	0	28	0	0	28	
<u>Kentucky:</u>							
Div. of Fish & Game	1959	March	10	0	0	0	10
		April	0	0	0	3	3
		May	0	0	12	0	12
		June	0	0	4	0	4
		July	0	0	1	0	1
		Total	10	0	17	3	30
	1960	March	26	0	0	0	26
		April	4	0	0	0	4
		May	0	0	3	0	3
		June	1	7	25	0	33
		July	0	0	3	0	3
		Total	31	7	31	0	69
Willie J. Parker	1960	June	1	0	0	25	26

Continued-----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Cont'd).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Louisiana:</u>							
Wild Life & Fisheries Commission	1959	May	1	0	0	0	1
		June	0	0	14	0	14
		July	0	0	14	0	14
		Aug.	0	88	18	0	106
		Sept.	21	228	6	0	255
		Oct.	70	78	0	0	148
		Total	92	394	52	0	538
	1960	Feb.	30	0	0	0	30
		March	14	0	0	0	14
		April	10	1	0	0	11
		June	37	30	13	0	80
		July	66	68	3	2	139
		Aug.	3	30	0	0	33
		Sept.	3	34	0	0	37
		Oct.	12	22	0	0	34
		Total	175	185	16	0	378
	1961	May	4	0	4	0	8
<u>Maine:</u>							
Moosehorn NWR	1959	Sept.	2	2	0	0	4
		Oct.	15	3	0	0	18
		Total	17	5	0	0	22
	1960	Sept.	16	3	0	0	19
		Oct.	0	3	0	0	3
		Total	16	6	0	0	22
Coop. Wildl. Res. Unit	1959	June	4	4	0	0	8
		July	2	1	2	0	5
		Aug.	0	0	4	0	4
		Total	6	5	6	0	17

Continued----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Cont'd).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Maine:</u>							
Coop. Wildl. Res. Unit	1960	June	2	0	0	0	2
	1961	June	0	0	4	0	4
<u>Manitoba:</u>							
Delta Waterfowl Research Station	1959	June	15	0	0	0	15
		July	1	0	0	0	1
		Aug.	22	4	0	0	26
		Sept.	<u>12</u>	<u>4</u>	<u>0</u>	<u>0</u>	<u>16</u>
		Total	50	8	0	0	58
	1960	April	2	0	0	0	2
		May	4	0	0	0	4
		June	11	0	0	0	11
		July	1	0	0	0	1
		Aug.	11	0	0	0	11
		Sept.	<u>3</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>4</u>
		Total	32	1	0	0	33
	1961	Jan.	10	0	0	0	10
		June	<u>10</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>10</u>
		Total	20	0	0	0	20
Ducks Unlimited	1960	Aug.	1	0	0	0	1

Continued-----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Continued).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Massachusetts:</u>							
Parker River NWR	1959	Sept.	23	9	0	0	32
		Oct.	12	5	0	0	17
		Total	35	14	0	0	49
	1960	Sept.	50	59	0	0	109
Richard Borden	1959	June	0	11	0	0	11
Stuart D. Henderson	1961	May	5	0	0	0	5
David K. Wetherbee	1960	May	1	0	0	0	1
<u>Michigan:</u>							
Department of Conservation	1959	May	1	0	0	0	1
		June	2	0	16	0	18
		July	15	0	96	0	111
		Aug.	12	28	11	0	51
		Sept.	6	7	2	0	15
		Oct.	4	1	0	0	5
		Total	40	36	125	0	201
	1960	July	0	0	14	0	14
		Aug.	15	54	27	0	96
		Sept.	26	61	4	0	91
		Total	41	115	45	0	201
Seney NWR	1959	July	2	11	0	0	13
		Aug.	68	10	0	0	78
		Sept.	36	16	0	0	52
		Oct.	6	2	0	0	8
		Total	112	39	0	0	151

Continued---

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Cont'd.).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Michigan:</u>							
Seney NWR	1960	Aug.	49	36	0	0	84
		Sept.	36	22	0	1	59
		Oct.	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>
		Total	86	58	0	1	145
Shiawassee NWR	1959	July	0	5	0	0	5
		Aug.	0	9	0	0	9
		Sept.	18	65	0	0	83
		Oct.	<u>3</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>5</u>
		Total	21	81	0	0	102
	1960	Aug.	0	5	0	0	5
		Sept.	<u>0</u>	<u>3</u>	<u>0</u>	<u>0</u>	<u>3</u>
		Total	0	8	0	0	8
	1959	April	1	0	0	0	1
		July	5	0	1	0	6
		Aug.	12	21	0	0	33
		Sept.	<u>7</u>	<u>13</u>	<u>0</u>	<u>0</u>	<u>20</u>
		Total	25	34	1	0	60
	1960	Aug.	1	12	0	0	13
		Sept.	0	2	0	0	2
		Oct.	<u>2</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>4</u>
		Total	3	16	0	0	19
Karl Christofferson	1960	Sept.	0	9	0	0	9
		Oct.	<u>4</u>	<u>9</u>	<u>0</u>	<u>0</u>	<u>13</u>
		Total	4	18	0	0	22

Continued---

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Cont'd.).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Minnesota:</u>							
Dept. of Conservation	1959	July	0	0	1	0	1
		Sept.	107	271	0	1	379
		Oct.	<u>3</u>	<u>7</u>	<u>6</u>	<u>0</u>	<u>16</u>
		Total	110	278	7	1	396
Upper Miss. River NWR	1959	July	3	0	74	3	80
		Sept.	<u>33</u>	<u>57</u>	<u>0</u>	<u>9</u>	<u>99</u>
		Total	36	57	74	12	179
	1960	June	2	0	1	0	3
		July	0	0	22	0	22
		Aug.	2	4	12	0	18
		Sept.	<u>38</u>	<u>88</u>	<u>0</u>	<u>0</u>	<u>126</u>
		Total	42	92	35	0	169
	Rice Lake NWR	Aug.	34	31	0	0	65
		Sept.	7	16	0	0	23
		Oct.	<u>1</u>	<u>9</u>	<u>0</u>	<u>0</u>	<u>10</u>
		Total	42	56	0	0	98
		July	3	0	0	0	3
		Aug.	38	11	0	0	49
		Sept.	3	3	0	0	6
		Oct.	<u>19</u>	<u>41</u>	<u>0</u>	<u>0</u>	<u>60</u>
		Total	63	55	0	0	118
Carl M. Johnson	1959	March	1	0	0	0	1
		Sept.	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>
		Total	2	0	0	0	2
Forest V. Strnad	1959	Dec.	2	0	0	0	2
Mud Lake NWR	1960	Sept.	1	0	0	0	1

Continued-----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Continued).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Mississippi:</u>							
William R. Edwards	1960	July	0	4	0	0	4
<u>Missouri:</u>							
Conservation Commission	1959	June	2	0	25	0	27
		July	10	72	26	0	108
		Aug.	24	93	0	0	117
		Sept.	81	150	0	0	231
		Oct.	62	87	0	0	149
		Total	179	402	51	0	632
	1960	June	0	0	3	0	3
		July	11	46	12	0	69
		Aug.	24	26	9	1	60
		Sept.	124	68	2	0	194
		Oct.	12	9	0	0	21
		Total	171	149	26	1	347
Mingo NWR	1959	Sept.	3	11	0	0	14
		Oct.	19	2	0	0	21
		Total	22	13	0	0	35
	1960	March	0	0	0	4	4
		Aug.	18	16	0	0	34
		Sept.	18	31	0	0	49
Squaw Creek NWR	1959	Total	36	47	0	4	87
		March	2	0	0	0	2
		Sept.	2	4	0	0	6
		Total	4	4	0	0	8

Continued ---

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Cont inued).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages	
<u>New Brunswick:</u>								
Bruce Wright	1959	Sept.	32	14	0	0	46	
		Oct.	<u>2</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>4</u>	
		Total	34	14	0	2	50	
	1960	Aug.	3	6	0	0	9	
		Sept.	<u>6</u>	<u>7</u>	<u>0</u>	<u>0</u>	<u>13</u>	
		Total	9	13	0	0	22	
<u>New Hampshire:</u>								
Howard Brown	1959	Sept.	12	39	10	0	61	
	1960	May	2	0	0	0	2	
		June	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	
		Total	3	0	0	0	3	
	William D. Snow	1960	Aug.	9	26	0	0	35
			Sept.	<u>0</u>	<u>14</u>	<u>0</u>	<u>0</u>	<u>14</u>
Total			9	40	0	0	49	
<u>New Jersey:</u>								
Brigantine NWR	1959	Sept.	1	12	0	0	13	
		Oct.	6	6	0	0	12	
		Nov.	<u>5</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>5</u>	
		Total	12	18	0	0	30	
	W. A. Jarvis	1960	Sept.	0	0	0	2	2

Continued----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Continued).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<b>New York:</b>							
Dept. of Conservation	1959	April	1	0	0	0	1
		May	8	0	0	0	8
		June	7	0	4	0	11
		July	16	34	22	0	72
		Aug.	48	97	69	0	214
		Sept.	46	61	0	0	107
		Oct.	74	159	0	0	233
		Total	200	351	95	0	646
	1960	May	22	0	0	0	22
		June	10	0	0	0	10
		Aug.	72	306	0	1	379
		Sept.	62	179	0	0	241
		Oct.	4	13	0	0	17
		Nov.	2	1	0	0	3
		Total	172	499	0	1	672
Montezuma NWR	1960	July	2	0	3	0	5
		Sept.	14	10	0	0	24
		Oct.	8	11	0	6	25
		Total	24	21	3	6	54
Stanley O. Grierson	1959	Aug.	6	3	0	0	9
		Sept.	7	4	0	0	11
		Total	13	7	0	0	20
John W. Taylor	1960	Feb.	2	0	0	0	2
Eugene Decker	1959	May	1	0	0	0	1
Leroy Wilcox	1960	Aug.	0	1	0	0	1

Continued----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Cont'd.).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>North Carolina:</u>							
Wildl. Resources Comm.	1959	Nov.	2	4	0	0	6
	1960	Feb.	0	0	0	6	6
		March	2	0	0	24	26
		April	0	0	0	16	16
		May	0	0	0	67	67
		June	17	0	2	0	19
		July	0	0	4	0	4
		Aug.	1	0	2	0	3
		Nov.	16	11	0	0	27
		Dec.	3	0	0	1	4
		Total	39	11	8	114	172
	1961	Jan.	0	3	0	2	5
Donald L. Cross	1960	March	9	0	0	0	9
F. Eugene Hester	1961	May	8	0	0	0	8
<u>North Dakota:</u>							
Arrowwood NWR	1959	Sept.	7	0	0	0	7
<u>Ohio:</u>							
Dept. Nat. Resources	1959	Jan.	1	0	0	0	1
		April	3	0	0	0	3
		May	34	0	0	0	34
		June	10	0	103	6	119
		July	4	1	144	3	152
		Aug.	20	43	7	0	70
		Sept.	43	5	0	4	52
		Oct.	36	46	0	2	84
		Total	151	95	254	15	515

Continued—

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Cont'd.).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Ohio:</u>							
Dept. Nat. Resources	1960	April	10	0	0	0	10
		May	109	0	0	0	109
		June	25	34	327	0	386
		July	18	5	70	0	93
		Aug.	1	2	16	0	19
		Sept.	18	12	0	19	49
		Oct.	49	10	0	0	59
		Nov.	11	0	0	0	11
		Dec.	1	0	0	0	1
		Total	242	63	413	19	737
	1961	April	14	0	0	0	14
		May	1	0	0	0	1
		Total	15	0	0	0	15
Laurel Van Camp	1959	April	1	0	0	0	1
		May	1	0	0	0	1
		June	1	0	0	0	1
		Total	3	0	0	0	3
	1960	May	6	0	0	0	6
		June	4	0	0	0	4
		Total	10	0	0	0	10
	1961	May	6	0	0	0	6
H. R. Dalrymple	1959	May	5	0	0	0	5
	1960	May	6	0	0	0	6
	1961	May	3	0	0	0	3

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Cont'd.).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Ohio:</u>							
Tim Dilworth	1959	June	0	0	5	0	5
		July	$\frac{1}{0}$	$\frac{0}{0}$	$\frac{3}{8}$	$\frac{0}{0}$	$\frac{4}{9}$
		Total	1	0	8	0	9
Jay M. Shepherd	1960	Aug.	0	0	1	0	1
<u>Ontario:</u>							
Edward Kroll	1959	Aug.	1	1	0	0	2
		Sept.	6	8	0	0	14
		Oct.	$\frac{1}{0}$	$\frac{4}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{5}{21}$
		Total	8	13	0	0	21
	1960	July	0	1	0	0	1
		Aug.	8	6	0	0	14
		Sept.	12	12	0	0	24
		Oct.	$\frac{1}{0}$	$\frac{1}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{2}{41}$
		Total	21	20	0	0	41
L. A. Gray	1959	Sept.	2	4	0	0	6
		Oct.	$\frac{0}{0}$	$\frac{6}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{6}{12}$
		Total	2	10	0	0	12
Robert Catton	1959	Sept.	2	8	0	0	10
Robert Stamp	1959	Sept.	1	2	0	0	3
W. C. Baker	1960	July	0	2	0	0	2
Alfred Bunker	1959	April	2	0	0	0	2
Marshall Field	1959	April	2	0	0	0	2

Continued-----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Cont'd.).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages	
<u>Oregon:</u>								
State Game Commission	1959	May	6	0	0	0	6	
		June	8	0	0	0	8	
		Sept.	5	66	0	0	71	
		Total	19	66	0	0	85	
	1960	May	1	0	0	0	1	
		Sept.	2	61	0	0	63	
		Oct.	23	114	0	0	137	
		Total	26	175	0	0	201	
	<u>Pennsylvania:</u>							
	Paul H. Fluck	1959	April	2	0	0	0	2
May			2	0	0	0	2	
Aug.			0	0	2	0	2	
Sept.			0	14	0	0	14	
Total			4	14	2	0	20	
1960		May	2	0	0	0	2	
		June	2	0	0	0	2	
		Aug.	0	7	0	0	7	
		Oct.	1	4	0	0	5	
		Total	5	11	0	0	16	
S. T. Miller	1959	June	2	0	0	0	2	
		Sept.	2	0	0	0	2	
		Total	4	0	0	0	4	
State Game Commission	1959	Sept.	1	2	0	0	3	
Robert C. Leberman	1960	Dec.	0	0	0	1	1	

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Cont'd.).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Prince Edward Island:</u>							
C. O. Bartlett	1959	July	1	0	0	0	1
	1960	July	1	0	0	0	1
<u>Quebec:</u>							
Gaston Moisan	1960	Aug.	0	2	0	0	2
<u>Rhode Island:</u>							
Div. of Fish & Game	1960	April	4	0	0	0	4
		May	28	0	0	0	28
		June	24	0	0	0	24
		Aug.	2	13	0	0	15
		Sept.	1	4	0	0	5
		Total	59	17	0	0	76
<u>South Carolina:</u>							
William C. Lehmann	1960	April	6	0	0	0	6
		May	92	0	0	0	92
		June	66	0	0	0	66
		July	17	0	0	0	17
		Aug.	60	10	0	0	70
		Sept.	2	0	0	0	2
		Total	243	10	0	0	253
Santee NWR	1960	June	17	2	0	0	19
		July	39	5	0	0	44
		Total	56	7	0	0	63
R. G. MacFarlan	1961	Jan.	0	0	0	6	6

Continued-----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Cont'd.).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>South Dakota:</u>							
Sand Lake NWR	1959	Aug.	0	1	0	0	1
<u>Tennessee:</u>							
Dept. Conservation	1959	March	1	0	0	0	1
		April	8	0	0	0	8
		July	1	0	14	0	15
		Aug.	2	0	21	0	23
		Sept.	0	1	3	71	75
		Oct.	16	23	0	0	39
		Nov.	21	22	0	0	43
		Total	49	46	38	71	204
	1960	Aug.	0	0	1	70	71
		Sept.	4	9	5	51	69
		Oct.	3	14	0	5	22
		Total	7	23	6	126	162
Reelfoot NWR	1961	April	7	0	0	0	7
	1959	Aug.	1	45	6	0	52
		Sept.	72	24	0	0	96
		Oct.	3	1	0	0	4
		Total	76	70	6	0	152
James T. Hammond	1961	Feb.	34	0	0	0	34
<u>Utah:</u>							
Fish & Game Commission	1959	Sept.	0	1	0	0	1

Continued

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Continued).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Vermont:</u>							
Fish & Game Service	1959	April	2	0	0	0	2
		May	12	0	0	0	12
		June	10	0	0	0	10
		July	2	0	0	0	2
		Aug.	6	31	5	0	42
		Sept.	93	152	11	0	256
		Total	125	183	16	0	324
	1960	May	12	0	0	0	12
		June	20	0	0	0	20
		Aug.	11	115	14	0	140
		Sept.	52	160	1	0	213
		Oct.	3	1	0	0	4
		Total	98	276	15	0	389
Missisquoi NWR	1960	May	10	0	0	0	10
		Aug.	59	194	0	0	253
		Sept.	83	104	0	0	187
		Total	152	298	0	0	450
<u>Virginia:</u>							
Arthur H. Fast	1960	Aug.	0	28	0	0	28
<u>Washington:</u>							
Dept. of Game	1959	Feb.	2	0	0	0	2
		July	2	0	2	0	4
		Aug.	0	3	1	0	4
		Sept.	1	1	0	0	2
		Total	5	4	3	0	12

Continued-----

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Continued).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages
<u>Washington:</u>							
Dept. of Game	1960	April	38	0	0	0	38
		May	12	0	0	0	12
		June	0	0	1	0	1
		July	<u>2</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>3</u>
		Total	52	0	2	0	54
Willapa NWR	1960	Aug.	0	0	0	14	14
McNary NWR	1960	Aug.	0	1	0	0	1
		Sept.	<u>1</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>3</u>
		Total	1	3	0	0	4
Columbia NWA	1960	Sept.	0	2	0	0	2
<u>West Virginia:</u>							
Conservation Comm.	1959	March	25	0	0	0	25
		April	39	0	0	0	39
		June	2	4	20	0	26
		July	16	70	23	0	109
		Aug.	2	64	1	0	67
		Oct.	<u>2</u>	<u>4</u>	<u>0</u>	<u>0</u>	<u>6</u>
		Total	86	142	44	0	272
	1960	March	6	0	0	0	6
		April	20	0	0	0	20
		June	1	0	30	0	31
		July	0	1	6	0	7
		Aug.	1	2	0	0	3
		Sept.	2	18	0	0	20
		Oct.	<u>6</u>	<u>23</u>	<u>0</u>	<u>0</u>	<u>29</u>
		Total	36	44	36	0	116
Alan W. Souder	1959	Feb.	1	0	0	0	1

Continued

Table 1. Summary of Wood Duck Banding, 1959 through Spring, 1961 (Continued).

State and Permittee	Year	Month	Adult	Immature	Local	Unknown	All Ages	
<u>Wisconsin:</u>								
Upper Miss. River NWR	1959	June	0	0	10	0	10	
		July	0	0	12	1	13	
		Aug.	34	250	0	0	284	
		Sept.	<u>129</u>	<u>357</u>	<u>0</u>	<u>0</u>	<u>486</u>	
		Total	163	607	22	1	793	
	1960	June	1	0	6	0	7	
		July	6	0	43	0	49	
		Aug.	213	1,066	72	4	1,355	
		Sept.	138	375	0	6	519	
		Oct.	<u>11</u>	<u>13</u>	<u>0</u>	<u>0</u>	<u>24</u>	
		Total	369	1,454	121	10	1,954	
	1961	April	1	0	0	0	1	
		May	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	
		Total	2	0	0	0	2	
	Needah NWR	1959	Aug.	9	2	0	0	11
			Sept.	<u>56</u>	<u>3</u>	<u>0</u>	<u>0</u>	<u>59</u>
			Total	65	5	0	0	70
1960		Aug.	74	46	2	1	123	
		Sept.	75	43	0	0	118	
		Nov.	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>1</u>	
		Total	149	90	2	1	242	
Horicon NWR		1959	Sept.	13	0	0	0	13
			Oct.	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>
			Total	14	0	0	0	14
		1960	July	28	3	0	0	31
			Aug.	19	1	0	0	20
	Oct.		<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>1</u>	
Total	47		5	0	0	52		
Dept. of Conservation	1959	Sept.	17	26	0	0	43	

Table 2. Summary of Wood Duck Direct Recovery Rates for June-October Bandings, 1959-1960.\*

State of Banding	Year Banded	Number Banded			Number Recovered			Direct Recovery Rate		
		Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.
<u>Oregon</u>	1959	-	-	14	-	-	0	-	-	(0.0)
	1960	-	-	72	-	-	6	-	-	4.6
<u>Manitoba</u>	1959	50	-	-	0	-	-	0.0	-	-
	1960	26	-	-	0	-	-	(0.0)	-	-
<u>Minnesota</u>	1959	185	375	81	13	31	8	7.0	8.3	9.9
	1960	87	108	35	8	10	1	9.2	9.2	(2.8)
<u>Wisconsin</u>	1959	258	638	22	16	52	1	6.2	8.2	4.5
	1960	554	1,534	123	35	151	15	6.3	9.8	12.2
<u>Michigan</u>	1959	183	185	126	17	22	8	9.3	11.9	6.3
	1960	127	204	45	5	18	3	3.9	8.8	(6.7)
<u>New York</u>	1958	53	456	-	4	41	-	7.5	9.0	-
	1959	130	199	95	2	11	5	1.5	5.5	5.3
	1960	160	496	3	7	39	1	4.4	7.9	(33.3)
<u>Vermont</u>	1958	73	274	47	11	37	6	15.1	13.5	(12.8)
	1959	111	183	16	9	22	1	8.1	12.2	(6.2)
	1960	225	573	15	17	53	0	7.6	9.2	(0.0)
<u>N. Hampshire</u>	1959	-	39	-	-	1	-	-	(2.6)	-
	1960	-	40	-	-	0	-	-	(0.0)	-
<u>Massachusetts</u>	1959	35	9	-	0	1	-	(0.0)	(11.1)	-
	1960	50	59	-	0	4	-	0.0	6.8	-
<u>Ohio</u>	1959	79	49	262	6	4	11	7.6	(8.2)	4.2
	1960	66	53	414	0	2	5	0.0	3.8	1.2
<u>Indiana</u>	1959	128	97	23	4	2	1	3.1	2.1	(4.3)
	1960	436	294	70	22	23	0	5.0	7.8	0.0
<u>Illinois</u>	1959	71	266	-	6	8	-	8.4	3.0	-
	1960	132	904	-	5	60	-	3.8	6.6	-
<u>Iowa</u>	1959	45	178	18	2	13	1	(4.4)	7.3	(5.6)
	1960	41	445	110	3	42	6	(7.3)	9.4	5.4
<u>Missouri</u>	1959	122	330	51	6	21	1	4.9	6.4	2.0
	1960	195	187	26	8	6	3	4.1	3.2	(11.5)

Continued-----

Table 2. Summary of Wood Duck Direct Recovery Rates for June-October Bandings, 1959-1960 (Continued).

State of Banding	Year Banded	Number Banded			Number Recovered			Direct Recovery Rate		
		Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.
<u>West Virginia</u>	1959	-	142	44	-	5	1	-	3.5	(2.3)
	1960	-	44	36	-	4	3	-	(9.1)	(8.3)
<u>Tennessee</u>	1959	19	24	38	0	6	2	(0.0)	(25.0)	(5.3)
	1960	83	90	12	2	1	0	2.4	1.4	(0.0)
<u>Louisiana</u>	1959	22	316	52	1	21	0	(4.5)	6.6	(0.0)
	1960	109	162	16	0	9	0	0.0	5.6	(0.0)
<u>Alabama</u>	1959	-	-	14	-	-	0	-	-	(0.0)
	1960	-	-	72	-	-	6	-	-	8.3
South Carolina	1959	5	-	-	0	-	-	(0.0)	-	-
	1960	201	-	-	7	-	-	3.5	-	-

\* See text for detailed notes concerning data used in Table 2.

Table 3. Direct Recovery Distribution of Atlantic Flyway Wood Ducks Banded during June-December, 1959 and 1960.

State of Recovery	STATE OF BANDING																	
	Florida			Maine			Massachusetts			N. Brunswick			N. Hampshire			New York		
	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.
Alabama	0	0	—*	0	0	0	0	0	—	0	0	—	0	0	0	1	0	0
Florida	0	2	—	0	0	0	0	0	—	0	0	—	0	0	0	0	5	0
Georgia	0	0	—	0	0	0	0	1	—	0	0	—	0	0	0	0	3	0
Maine	0	0	—	1	0	0	0	0	—	0	0	—	0	0	0	0	0	0
Massachusetts	0	0	—	0	0	0	0	2	—	0	0	—	0	0	0	0	0	0
Mississippi	0	0	—	2	0	0	0	0	—	0	0	—	0	0	0	0	1	0
New York	0	0	—	0	0	0	0	0	—	0	0	—	0	1	0	3	22	6
N. Carolina	0	0	—	1	0	0	0	1	—	0	0	—	0	0	0	4	3	0
Ontario	0	0	—	0	0	0	0	0	—	0	0	—	0	0	0	2	9	0
Pennsylvania	0	0	—	0	0	0	0	0	—	0	0	—	0	0	0	0	2	0
S. Carolina	0	0	—	0	0	0	0	1	—	0	0	—	0	0	0	0	8	0
Tennessee	0	0	—	1	0	0	0	0	—	0	0	—	0	0	0	0	1	0
Texas	0	0	—	0	0	0	0	0	—	0	0	—	0	0	0	0	1	0
Vermont	0	0	—	0	0	0	0	0	—	0	0	—	1	0	0	0	0	0
Virginia	0	0	—	0	0	0	0	0	—	1	0	—	0	0	0	0	2	0
W. Virginia	0	0	—	0	0	0	0	0	—	0	0	—	0	0	0	0	1	0
TOTAL	0	2	—	5	0	0	0	5	—	1	0	—	1	1	0	10	58	6

Continued

Table 3. Direct Recovery Distribution of Atlantic Flyway Wood Ducks Banded during June-December, 1959 and 1960.

State of Recovery	STATE OF BANDING																		Total
	N. Carolina			Rhode Island			S. Carolina			Vermont			Virginia			W. Virginia			
	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	
Alabama	1	0	0	0	0	—	0	0	—	0	1	0	—	0	—	1	2	0	6
Florida	0	0	0	0	0	—	1	0	—	2	3	0	—	0	—	0	0	0	13
Georgia	0	0	0	0	0	—	0	0	—	2	2	0	—	0	—	0	0	0	8
Illinois	0	0	0	0	0	—	0	0	—	0	1	0	—	0	—	0	0	0	1
Louisiana	0	0	0	0	0	—	0	0	—	0	0	0	—	0	—	0	1	0	1
Maine	0	0	0	0	0	—	0	0	—	0	0	0	—	0	—	0	0	0	1
Maryland	0	0	0	0	0	—	0	0	—	0	1	0	—	0	—	0	0	0	1
Massachusetts	0	0	0	0	0	—	0	0	—	0	0	0	—	0	—	0	0	0	2
Mississippi	1	0	0	0	0	—	0	0	—	0	1	0	—	0	—	0	1	0	6
Missouri	0	0	0	0	0	—	0	0	—	0	1	0	—	0	—	0	0	0	1
New Jersey	0	0	0	0	0	—	0	0	—	0	2	0	—	0	—	0	0	0	2
New York	0	0	0	0	0	—	0	0	—	0	1	0	—	0	—	0	0	0	33
N. Carolina	1	0	0	0	0	—	0	0	—	0	5	0	—	0	—	0	0	0	15
Ohio	1	0	0	0	0	—	0	0	—	0	0	0	—	0	—	0	0	0	1
Ontario	0	0	0	0	0	—	0	0	—	1	0	0	—	0	—	0	0	0	12
Pennsylvania	0	0	0	0	0	—	0	0	—	1	0	0	—	0	—	0	0	0	3
Quebec	0	0	0	0	0	—	0	0	—	8	12	0	—	0	—	0	0	0	20
S. Carolina	1	0	0	1	1	—	6	2	—	2	4	0	—	1	—	0	1	0	28
Tennessee	0	0	0	0	0	—	0	0	—	0	2	0	—	0	—	0	0	0	4
Texas	0	0	0	0	0	—	0	0	—	0	0	0	—	0	—	0	0	0	1
Vermont	0	0	0	0	0	—	0	0	—	10	39	5	—	0	—	0	0	0	55
Virginia	0	0	0	0	0	—	0	0	—	0	0	0	—	1	—	0	0	0	4
W. Virginia	0	0	0	0	0	—	0	0	—	0	0	0	—	1	—	0	4	4	10
TOTAL	5	0	0	1	1	—	7	2	—	26	75	5	—	3	—	1	9	4	228

\* None banded during period.

Table 4. Direct Recovery Distribution of Mississippi Flyway Wood Ducks Banded during June-December, 1959 and 1960.

State of Recovery	STATE OF BANDING																	
	Alabama			Illinois			Indiana			Iowa			Louisiana			Michigan		
	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.
Alabama	0	1	4	0	0	--	1	2	0	0	0	0	0	0	0	1	1	0
Arkansas	0	0	0	1	12	--	1	0	1	1	2	0	0	1	0	2	3	1
Florida	0	0	0	1	0	--	0	1	0	0	0	0	0	0	0	2	1	0
Georgia	0	0	0	0	0	--	1	0	0	0	0	0	0	0	0	1	0	1
Illinois	0	0	0	0	21	--	3	1	0	0	2	1	0	0	0	0	1	0
Indiana	0	0	0	0	0	--	7	14	0	0	0	0	0	0	0	0	2	1
Iowa	0	0	0	1	0	--	0	0	0	1	17	2	0	0	0	0	0	0
Kansas	0	0	0	0	0	--	0	0	0	0	0	1	0	0	0	0	0	0
Kentucky	0	0	0	0	0	--	0	1	0	0	0	0	0	0	0	0	0	0
Louisiana	0	0	0	3	16	--	5	2	0	1	6	1	4	35	0	5	5	1
Michigan	0	0	0	0	0	--	0	0	0	0	0	0	0	0	0	7	26	5
Minnesota	0	0	0	1	1	--	0	0	0	1	0	0	0	0	0	0	0	0
Mississippi	0	0	2	2	7	--	5	3	0	0	3	0	0	0	0	0	2	2
Missouri	0	0	0	0	2	--	1	0	0	0	2	0	0	0	0	0	0	0
N. Carolina	0	0	0	0	0	--	0	0	0	0	0	0	0	0	0	1	0	0
Oklahoma	0	0	0	0	0	--	1	1	0	0	2	1	0	0	0	0	0	0
Ontario	0	0	0	0	0	--	0	1	0	0	0	0	0	0	0	2	0	0
S. Carolina	0	0	0	0	0	--	0	0	0	0	1	0	0	0	0	1	0	0
Tennessee	0	0	0	0	2	--	1	0	0	0	0	0	0	0	0	0	0	0
Texas	0	0	0	1	9	--	1	1	0	0	5	0	0	3	0	0	0	0
Wisconsin	0	0	0	2	1	--	0	1	0	1	17	1	0	0	0	1	0	0
TOTAL	0	1	6	12	72		27	28	1	5	57	7	4	39	0	23	41	11

Continued-----

(Continued)

Table 4. Direct Recovery Distribution of Mississippi Flyway Wood Ducks Banded during June-December, 1959 and 1960.

State of Recovery	Minnesota			Missouri			Ohio			Tennessee			Wisconsin			Total
	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	Ad.	Imm.	Loc.	
Alabama	2	1	1	0	1	0	3	0	1	1	2	1	4	1	0	28
Arkansas	3	2	0	3	6	1	0	0	1	1	0	0	5	14	1	62
Florida	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	8
Georgia	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	7
Illinois	1	1	2	2	1	0	0	0	0	0	0	0	0	10	1	48
Indiana	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25
Iowa	2	1	0	0	0	0	0	0	0	0	0	0	3	20	0	47
Kansas	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	4
Kentucky	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Louisiana	3	8	2	7	2	0	0	2	0	0	2	0	6	21	5	142
Michigan	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	40
Minnesota	5	23	3	0	0	0	0	0	0	0	0	0	2	19	3	58
Mississippi	4	0	0	1	0	1	1	0	0	0	2	1	2	8	0	46
Missouri	0	1	0	2	8	2	0	0	0	0	0	0	1	4	0	23
Nebraska	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
N. Carolina	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
Ohio	0	0	0	0	0	0	5	7	10	0	0	0	1	1	1	25
Oklahoma	0	1	0	1	3	0	0	0	0	0	0	0	0	1	0	11
Ontario	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	5
S. Carolina	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3
Tennessee	0	0	0	0	1	0	0	1	1	1	2	0	1	1	0	11
Texas	0	0	1	2	7	0	0	0	1	0	0	0	4	13	1	49
Wisconsin	1	6	0	0	0	0	0	0	0	0	0	0	20	83	4	138
TOTAL	22	45	9	18	29	4	10	13	16	3	8	2	51	204	16	784

Table 5. Relative Recovery Rate Estimate Based on Banding Data Summarized in Table 2. - All Years Combined.

State of Banding	Number Banded		Direct Recovery Rate		Relative Recovery Rate
	Adult	Immature	Adult	Immature	
Minnesota	272	483	7.7	8.5	1.1
Wisconsin	812	2,172	6.3	8.0	1.3
Michigan	310	389	7.1	10.3	1.5
New York	343	1,151	3.8	7.9	2.1
Vermont	409	1,030	10.3	11.6	1.1
Ohio	145	102	4.1	5.9	1.4
Indiana	564	391	4.6	6.4	1.4
Illinois	203	1,170	5.4	5.8	1.1
Iowa	86	623	5.8	8.8	1.5
Missouri	317	517	4.4	5.2	1.2
Louisiana	131	478	<u>0.8</u>	<u>6.3</u>	<u>7.9</u>
		Mean	5.5	7.7	1.4

Table 6 . Regional Differences in Direct Recovery Rates and Relative Recovery Rates of Immature to Adult Wood Ducks Banded in Vermont and Wisconsin.

Recovery			State of Banding			
			Vermont		Wisconsin	
			Adult	Immature	Adult	Immature
North of and including Minn., Wisc., Mich., N.Y., Conn., & R.I.	<u>Number Banded</u>	1959	111	183	258	638
		1960	<u>225</u>	<u>573</u>	<u>554</u>	<u>1,534</u>
	Years Combined		336	756	812	2,172
	<u>Number Recovered</u>	1959	8	17	6	27
		1960	<u>11</u>	<u>35</u>	<u>16</u>	<u>77</u>
	Years Combined		19	52	22	104
	<u>Direct Recovery Rate</u>	1959	7.2	9.3	2.3	4.2
		1960	<u>4.9</u>	<u>6.1</u>	<u>2.9</u>	<u>5.0</u>
	Years Combined		5.6	6.9	2.7	4.8
	<u>Relative Recovery Rate</u>	1959		1.3		1.8
South of and including Iowa, Ill., Ind., Ohio, Pa., and N.J.		1960		<u>1.2</u>		<u>1.7</u>
	Years Combined			1.2		1.8
	<u>Number Recovered</u>	1959	1	5	10	25
		1960	<u>6</u>	<u>18</u>	<u>19</u>	<u>74</u>
	Years Combined		7	23	29	99
	<u>Direct Recovery Rate</u>	1959	0.9	2.7	3.9	3.9
		1960	<u>2.7</u>	<u>3.1</u>	<u>3.4</u>	<u>4.8</u>
	Years Combined		2.1	3.0	3.6	4.6
	<u>Relative Recovery Rate</u>	1959		3.0		1.0
		1960		<u>1.1</u>		<u>1.4</u>
	Years Combined			1.4		1.3

**Table 7. Direct Recovery Rates for Immature Wood Ducks in Regions Selecting Different Opening Dates for the Hunting Season.**

Opening Date	State	Number Banded		Recovery Rate	
		1959	1960	1959	1960
Oct. 7-10	Minnesota	375	108	8.3	9.2
	Wisconsin	638	1,534	8.2	9.8
	Michigan	185	204	11.9	8.8
	Vermont	183	573	<u>12.2</u>	<u>9.2</u>
			Mean	10.2	9.2
Oct. 14-30	Iowa	178	445	7.3	9.4
	Illinois	266	904	3.0	6.6
	Ohio	--*	53	--	3.8
	New York	199	496	<u>5.5</u>	<u>7.9</u>
			Mean	5.3	6.9
Nov. 4-30	Indiana	97	294	2.1	7.8
	Missouri	330	187	6.4	3.2
	Tennessee	--	90	--	1.4
	West Virginia	142	--	3.5	--
	Louisiana	316	162	<u>6.6</u>	<u>5.6</u>
			Mean	4.6	4.5

\* Less than 50 banded birds.

Table 8. Estimate of the 1960-61 Preseason Wood Duck Population in the Atlantic and Mississippi Flyways.

Source	Information	Estimate
Mail Questionnaire Survey	Total Retrieved Hunting Kill	266,873
Wing Collection Survey	Age Ratio (Imm./Ad.)	2.1
Mail Questionnaire and Wing Collection Survey	Hunting Kill by Age Group	
	Adults	86,088
	Immatures	<u>180,785</u>
	Total	266,873
Table 5	Direct Band Recovery Rate	
	Adults	0.055
	Immatures	0.077
Direct Recovery Rate Plus Adjustment for Unreported Bands *		0.112
	Hunting Kill Rate	0.157
Hunting Kill Divided by Hunting Kill Rate	Pre-season Population Estimate	
	Adults	768,643
	Immatures	<u>1,151,497</u>
	Total	1,920,140

100321

\* Geis and Atwood, 1961